

REVIEW ARTICLE

Adherence to Referral Criteria for Burn Patients; a Systematic Review

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Received: March 2022; Accepted: April 2022; Published online: 2 June 2022

Abstract: **Introduction:** Burn injuries are under-appreciated trauma, associated with substantial morbidity and mortality. It is necessary to refer patients in need of specialized care to more specialized centers for treatment and rehabilitation of burn injuries. This systematic review aimed to assess the adherence to referral criteria for burn patients. **Methods:** An extensive search was conducted on Scopus, PubMed, and Web of Science online databases using the relevant keywords from the earliest to October 7, 2021. The quality of the included studies was assessed using the appraisal tool for cross-sectional studies (AXIS tool). **Results:** Among a total of 7,455 burn patients included in the nine studies, 60.95% were male. The most frequently burned areas were the hands (n=3) and the face (n=2). The most and least common burn mechanisms were scalds (62.76%) and electrical or chemical (2.88%), respectively. 51.88% of burn patients had met ≥ 1 referral criteria. The overall adherence to the referral criteria for burn patients was 58.28% (17.37 to 93.39%). The highest and lowest adherence rates were related to Western Cape Provincial (WCP) (26.70%) and National Burn Care Review (NBCR) (4.97%) criteria, respectively. **Conclusion:** The overall adherence to the referral criteria for burn patients was relatively desirable. Therefore, well-designed future studies are suggested in order to uncover approaches to improve adherence to referral criteria for burn patients.

Keywords: Burns; Guideline adherence; Referral and consultation; Systematic review

Cite this article as: Bazzi A, Ghazanfari MJ, Norouzi M, Mobayen M, Jafaraghaee F, Emami Zeydi A, Osuji J, Karkhah S. Adherence to Referral Criteria for Burn Patients; a Systematic Review. Arch Acad Emerg Med. 2022; 10(1): e43. <https://doi.org/10.22037/aaem.v10i1.1534>.

1. Introduction

Burn injuries are under-appreciated trauma associated with substantial morbidity and mortality (1-9). Based on the re-

port by World Health Organization, 11 million burns occur annually worldwide, 180,000 are fatal (10). Therefore, it is necessary to refer patients in need of specialized care to more specialized centers for treatment and rehabilitation of burn injuries (11).

Meanwhile, referral criteria for transferring burn patients to burn specialty centers have been proposed by various burn associations in the USA, the United Kingdom, and Australia and New Zealand (11). However, despite using referral criteria for burn patients for more than two decades, there is still limited information on adherence to these criteria. In the Netherlands, adherence to the Emergency Management of Severe Burns (EMSB) criteria in patients primarily present-

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ing to a non-burn center was 70.03% (11) Two studies in the USA showed that adherence to the American Burn Association (ABA) and EMSB criteria in patients primarily presenting to a non-burn center was 48.00% and 54%, respectively (12, 13). However, a study in the United Kingdom found that adherence to the British Burns Association (BBA) criteria in burn patients was 25.31% (14). The need to adhere to these criteria worldwide and the possible improved outcomes for burn patients cannot be overemphasized, hence the need to conduct this systematic review.

Limited and contradictory studies have been published on adherence to referral criteria for burn patients. This systematic review aimed to assess the adherence to referral criteria for burn patients.

2. Methods

This systematic review was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (15).

2.1. Search strategy

An extensive search was conducted on Scopus, PubMed, and Web of Science online databases using keywords such as "Burns", "Guideline adherence", "Patients", and "Referral criteria" from the earliest to October 7, 2021. For example, the search strategy in PubMed/MEDLINE database was (("Guideline Adherence") OR ("Policy Compliance") OR ("Protocol Compliance") OR ("Institutional Adherence") OR ("Adherence, Institutional")) AND (("Referral Criteria") OR ("Hospital Referral") OR ("Guidelines") OR ("Standards") OR ("Reference Standards") OR ("Criteria") OR ("Referral") OR ("Consultation") OR ("Consultation and Referral")) AND (("Burns") OR ("Patients") OR ("Clients")). Keywords were extracted from the medical subject headings and combined using Boolean operators (AND/OR). Two researchers performed the search steps, independently. In the present systematic review, the gray literature such as conference presentations, expert opinion, dissertations, research and committee reports, and ongoing research were not seriously searched because they did not fully depict the results, and the results may completely change when they are not published. Gray literature is defined as papers that are produced in print and electronic formats but are not controlled by commercial publishers (16).

2.2. Inclusion and exclusion criteria

In this review, studies published in English, focusing on adherence to referral criteria for burn patients were included (Table 1). The corresponding authors were contacted in cases of lack of access to articles or where relevant data was missing.

2.3. Study selection

EndNote X8 software was used to manage the data. Duplicate articles were removed, first electronically and then manually. Title, abstract, and full text of articles were assessed based on inclusion/exclusion criteria. The reference list of eligible studies was reviewed to prevent missing relevant information. In case of disagreement between researchers, the articles were evaluated by a third researcher.

2.4. Data extraction and quality assessment

Assessment of the quality of included studies was performed by two researchers. The researchers extracted information from the included studies. The information included the name of the first author, year of publication, location, sample size, male/female ratio, age, source of data collection, length of stay, burn mechanism, number of referral criteria met, the most frequently burned area, rate of adherence to referral criteria, the highest and lowest rates of adherence to referral criteria, instrument, and key results. The quality of the included studies was assessed using the appraisal tool for cross-sectional studies (AXIS tool). This tool evaluates the quality of the included studies using 20 items (17).

3. Results

3.1. Study selection

A total of 822 studies (PubMed=268, Web of Science=135, and Scopus=419) were obtained via an initial database search, and three studies were obtained using the assessment of the reference list of eligible studies. Also, 216 and 123 duplicate records were removed electronically and manually, respectively. In the screening stage of the title and abstract of studies, out of 483 studies, 425 articles were removed due to the obvious irrelevance of their topics with this research and 33 studies were excluded due to the type of the studies (animal studies, experimental studies, case reports, editorial letters, conferences papers and dissertations, reviews, etc). After assessment of the full-text of 17 studies, six articles were excluded due to inappropriate study design or outcomes and two articles were excluded due to lack of desired information. Finally, nine studies (11-14, 18-22) were included in this systematic review (Figure 1).

3.2. Study characteristics

Among the 7,455 burn patients included in the nine studies (11-14, 18-22), 60.95% were male. All studies had a retrospective design. Of the studies included, two were in the USA (12, 13), two were in the United Kingdom (14, 22), two were in the Netherlands (11, 18), one was in Canada (20), one was in Denmark (21), and one was in South Africa (19) (Table 2). Of the included studies, three studies assessed the ABA crite-



Table 1: Eligibility Criteria

Criteria	Inclusion	Exclusion
Participants	Burn patients Patients of all age groups	Animal studies
Outcomes	Rate of adherence to referral criteria for burn patients The highest and lowest rate of adherence to referral criteria	-
Study Design	Cross-Sectional Retrospective	Case reports Experimental studies Letters to editors Conferences Reviews
Time Frame	The earliest to October 5, 2021	-

Table 2: Basic characteristics of the studies included in this systematic review

First Author/year	Study period	Design	Source of data collection	Sample Size	M/F ratio	Age* (years)
Chipp et al., 2008 (14) United Kingdom	2004	Retrospective	West Midlands Regional Burns Unit	561	53.00/47.00	N/A
Carter et al., 2010 (12) USA	2006 to 2007	Retrospective	North Carolina Hospital Association Patient Data System	2,036	66.80/33.20	48.05 (SD=17.75)
Rose et al., 2010 (22) United Kingdom	2010 (6-month period)	Retrospective	Administrative database	190	55.26/44.74	0 to 15
Baartmans et al., 2012 (18) Netherlands	2002 to 2004 & 2007 to 2008	Retrospective	Dutch National Trauma Registry	622	63.51/36.49	> 15
Davis et al., 2012 (13) USA	2008	Retrospective	ICD-9	750	N/A	39.00 (SD=23.00)
Reiband et al., 2014 (21) Denmark	2011 (3-months period)	Retrospective	ICD-10	97	70.10/29.90	10 months to 71 years
Boissin et al., 2017 (19) South Africa	2011 to 2015	Retrospective	Administrative database	1,165	55.71/44.29	0 to 12
Chambers et al., 2021 (20) Canada	2018 to 2019	Retrospective	Administrative database	244	62.30/37.70	0.50 to 87
Van Yperen et al., 2021 (11) Netherlands	2014 to 2018	Retrospective	Dutch National Trauma Registry	1,790	N/A	N/A

* at time of injury; ICD-9: International Classification of Diseases-9th revision; ICD-10: International Classification of Diseases-10th revision; SD: Standard Deviation; N/A: not available.

ria (12, 13, 20), two studies evaluated the EMSB criteria (11, 18), one study assessed the BBA criteria (14), one study evaluated the National Burn Care Review (NBCR) criteria (22), one study assessed the National Burn Center (NBC) criteria (21), and one study evaluated the Western Cape Provincial (WCP) criteria (19) (Table 3).

3.3. Methodological Quality of included study

As presented in Figure 2, all included studies had justifications for sample size. Two studies did not define statistical significance. Six studies did not identify limitations. Four studies did not report funding sources or conflicts of interest, while four studies did not indicate the ethical approval/informed consent protocols used.

3.4. Characteristics of burn patients

As shown in Table 3, the average length of stay in the hospital for burn patients was seven days. The most frequently burned areas were the hands (n=3) (12, 20, 22) and the face (n=2) (14, 19). The most and least common burn

mechanisms were scalds (62.76%) and electrical or chemical (2.88%), respectively (Figure 3). 51.88% of burn patients had met ≥ 1 referral criteria (Table 3).

3.5. Adherence to referral criteria for burn patients

The overall adherence to the referral criteria for burn patients was 58.28% (17.37 to 93.39%) (Table 4). The highest and lowest rates of adherence were related to WCP (26.70%) and NBCR (4.97%) criteria, respectively (Figure 4).

4. Discussion

This systematic review showed that most frequently burned areas were the hands and the face. The most and least common burn mechanisms were scalds (62.76%) and electrical or chemical (2.88%), respectively. 51.88% of burn patients had met ≥ 1 referral criteria. The overall adherence to the referral criteria for burn patients was 58.28%. The highest and lowest adherence rates were related to WCP (26.70%) and NBCR



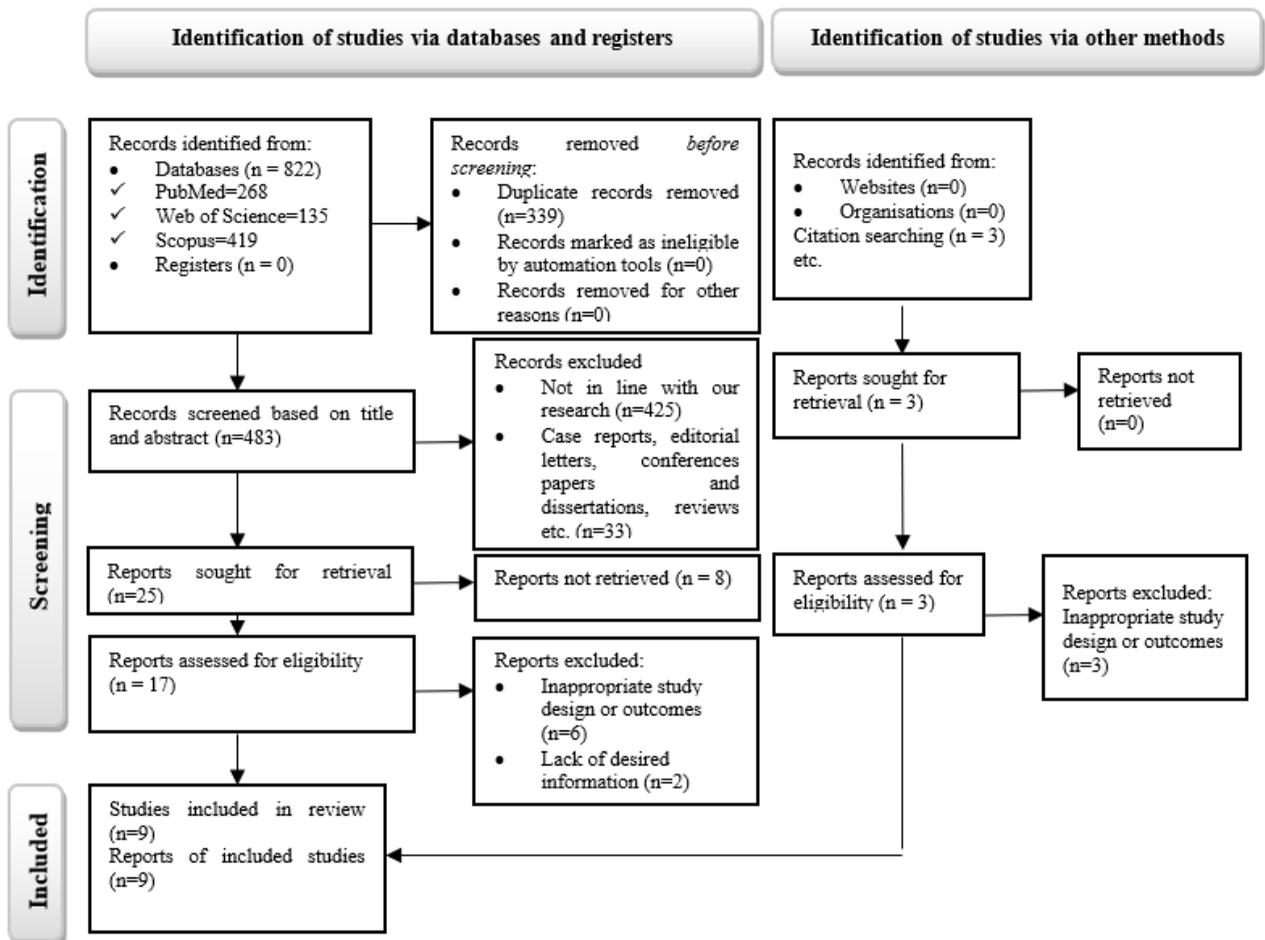


Figure 1: Flow diagram of the study selection process.

(4.97%) criteria, respectively.

As presented in this study, most commonly burned areas were the hands and the face. The greater prevalence of burns on the hands and face can be expected because these body parts are not usually covered. However, differences in burn areas may be due to differences in variables such as culture, customs, habits, geopolitical and climatic location in different societies. For example, in wars such as the Iraq and Vietnam wars, most of the injured areas were the face and hands due to explosions (23). Sunburn on the hands and the face is more common in parts of Spain and on cyclists (24). Therefore, although most burns occur on the hands and face, further studies are needed to assess the factors associated with it.

Based on the present study's findings, the most and least common burn mechanisms were scalds (62.76%) and electrical or chemical (2.88%), respectively. Scalds are more common in children (under 14 years old) and are caused by hot liquids. This finding was supported by a study in Iraq (25).

Children are more prone to scalds at home due to their mobility. On the other hand, electrical and chemical burns are less common due to lower exposure of people. However, it is suggested that future studies pay more attention to different age groups in different types of burns.

As presented in the present study, 51.88% of burn patients had met ≥ 1 referral criteria. There were differences in the number of referral criteria met in the studies, which can be explained by different referral criteria, family preferences, distance to the burn center, and insurance status (11).

The overall adherence to the referral criteria for burn patients was 58.28%. Also, the highest and lowest adherence rates were related to WCP (26.70%) and NBCR (4.97%) criteria, respectively. However, there were many differences in studies in terms of adherence to referral criteria. For example, a study in South Africa found that adherence to the referral criterion is 93.4% (19). In contrast, another study in the United Kingdom found that this adherence was 25.31% (14). This discrepancy may be due to differences in study design, ap-

		Chipp <i>et al.</i> , 2008	Carter <i>et al.</i> , 2010	Rose <i>et al.</i> , 2010	Baartmans <i>et al.</i> , 2012	Davis <i>et al.</i> , 2012	Reiband <i>et al.</i> , 2014	Boissin <i>et al.</i> , 2014	Chambers <i>et al.</i> , 2021	Van Yperen <i>et al.</i> , 2021
Introduction	Clear aims	*	*	*	*	*	*	*	*	*
	Appropriate design	*	*	*	*	*	*	*	*	*
Methods	Sample size justified	*	*	*	*	*	*	*	*	*
	Population defined	*	*	*	*	*	*	*	*	*
	Sample representative of population	*	*	*	*	*	*	*	*	*
	Selection process described	*	*	*	*	*	*	*	*	*
	Measures to address non-responders	-	-	-	-	-	-	-	-	-
	Appropriate outcome variables	*	*	*	*	*	*	*	*	*
	Valid measures	*	*	*	*	*	*	*	*	*
	Defined statistical significance	-	*	-	*	*	*	*	*	*
	Methods described	*	*	*	*	*	*	*	*	*
	Results	Results described	*	*	*	*	*	*	*	*
Concerns about non-response bias		-	-	-	-	-	-	-	-	-
Non-responder information described		-	-	-	-	-	-	-	-	-
Results internally consistent		*	*	*	*	*	*	*	*	*
Results presented for analyses		*	*	*	*	*	*	*	*	*
Discussion	Conclusions justified	*	*	*	*	*	*	*	*	*
	Limitations identified	-	-	-	*	*	-	-	-	*
Other	Funding sources or conflicts of interests	-	-	*	*	-	*	*	-	*
	Ethical approval/consent attained	-	-	-	*	-	*	*	*	*

Figure 2: Assessment of the quality of the included articles.

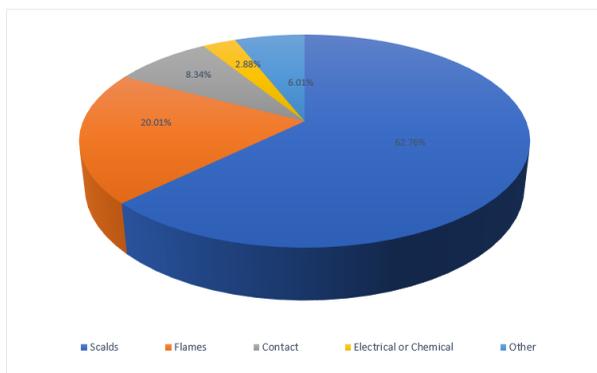


Figure 3: Burn mechanisms.

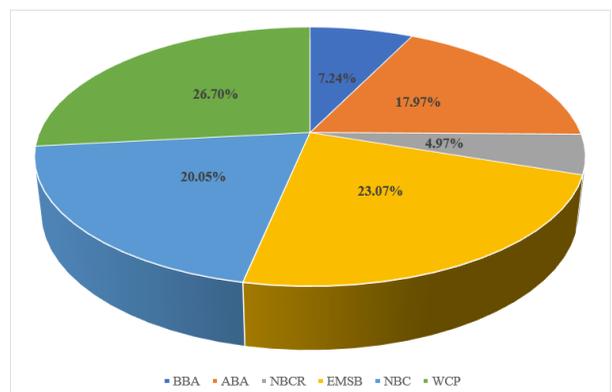


Figure 4: Adherence to referral criteria for burn patients.

plicable referral criteria, outcome criteria, and definition of adherence between different studies (11, 14, 19).



4.1. Implications for education, practice, and management

Adherence to referral criteria for burn patients will improve patient outcomes and ensure that burn patients are managed according to the latest evidence-based approaches. Findings of this systematic review indicate that much improvement is needed in educating hospital staff regarding making the necessary and timely referrals of burn patients based on laid down criteria. This calls for strategies that can improve adherence to referral criteria and reduce burn complications. The creation of a comprehensive burn system under the supervision of a burn specialist and the development of standards and evidence-based protocols for burn control, allocation of sufficient resources to burn systems and units, the hiring of adequate human resources, appropriate burn dressing and care, development of appropriate programs for regular visits to patients by burn specialists, and holding appropriate workshops for patients and health care providers can help manage burn patients.

4.2. Implications for future research

The findings of this systematic review can help improve referral patterns in burn patients admitted to non-burn centers. However, not all referral criteria are appropriate for managing burn patients, and some require serious revision. There is also a need for further research on whether modifying some referral criteria or training physicians in non-burn centers can increase adherence to referral criteria.

4.3. Limitations

This systematic review had several limitations. Although this systematic review was conducted based on the PRISMA checklist, it was not registered in the international prospective register of systematic reviews (PROSPERO) database, and a public protocol does not exist. Despite a comprehensive systematic search in this review, researchers may not have found all studies published in this area. Also, language bias cannot be ignored because only English language studies were included in the present study.

5. Conclusion

Although the overall adherence to the referral criteria for burn patients was relatively desirable, there is room for improvement. The highest and lowest adherence rates were related to WCP (26.70%) and NBCR (4.97%) criteria, respectively. Therefore, it is suggested to perform well-designed studies that will focus on interventions to improve adherence to referral criteria for burn patients in the future.

6. Declarations

6.1. Acknowledgments

None.

6.2. Data availability

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

6.3. Authors' contributions

Study concept and design by all authors; Data acquisition by all authors; Data interpretation by all authors; drafting the manuscript by all authors; Revision of the manuscript by all authors; the final version of the manuscript is approved by all authors.

6.4. Funding and supports

None.

6.5. Conflict of interest

The authors declare no conflict of interest.

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Table 3: Referral criteria for the management of burn patients (continues)

Author/year Criteria	Description
Chipp et al., 2008 (14) BBA	<p>Criteria for Complex Burn</p> <ul style="list-style-type: none"> ◦ Extremes of age (<5 or >60) ◦ Involvement of face/hands/perineum/feet ◦ Involvement of neck/axilla ◦ Circumferential deep dermal/full-thickness burns/limbs, torso/neck ◦ Inhalation injury ◦ Chemical injury (>5% TBSA) ◦ Ionizing radiation injury ◦ High-pressure steam injury ◦ High-tension electrical injury ◦ Hydrofluoric acid injury (>1% TBSA) ◦ Suspicion of non-accidental burn injury <p>Area involved</p> <p>Superficial</p> <ul style="list-style-type: none"> >10 % children <16 years' old >15 % adults ◦ Deep dermal or full-thickness >5% adult or child ◦ Small full-thickness burns should be discussed with a plastic surgeon <p>Co-morbid conditions</p> <ul style="list-style-type: none"> ◦ Cardiac limitation/myocardial infarction within 5 years ◦ Respiratory limitation of exercise ◦ Diabetes ◦ Pregnancy ◦ Immunosuppression ◦ Hepatic impairment ◦ Associated injuries (crush injuries, fractures, head injury)
Carter et al., 2010 (12); Davis et al., 2012 (13) Chambers et al., 2021 (20) ABA	<ul style="list-style-type: none"> ◦ Partial-thickness burns greater than 10% TBSA ◦ Burns that involve the face, hands, feet, genitalia, perineum, or major joints ◦ Third-degree burns in any age group ◦ Electrical burns, including lightning injury ◦ Chemical burns ◦ Inhalation injury ◦ Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality ◦ Any patients with burns and concomitant trauma (such as fractures) in which the burn injury poses a greatest risk of morbidity or mortality. In such cases, if the trauma poses a greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn unit. Physician judgment will be necessary in such situations and should be in line with the regional medical control plan and triage protocols ◦ Burned children in hospitals without qualified personnel or equipment for the care of children ◦ Burn injury in patients who will require special social, emotional, or long-term rehabilitative intervention
Rose et al., 2010 (22) NBCR	<p>Age</p> <p>Under 5yrs and over 60yrs</p> <p>Site Involvement</p> <p>Face, Hands, Feet, Perineum, Flexures particularly neck or axilla, circumferential or full-thickness burns of limbs, torso, or neck</p> <p>Inhalation Injury</p> <p>Excluding pure carbon monoxide poisoning</p> <p>Mechanism of Injury</p> <ul style="list-style-type: none"> ◦ Chemical Injury (>5% TBSA) ◦ Exposure to ionizing radiation ◦ High-pressure steam injury ◦ High-tension electrical injury ◦ Hydrofluoric Acid injury (>1% TBSA) ◦ Suspicion of Non-Accidental Injury (NAI) <p>Size of Skin Injury</p> <ul style="list-style-type: none"> ◦ Pediatrics >5% TBSA; Adult >10% TBSA

Table 3: Referral criteria for the management of burn patients

Author/year Criteria	Description
	<ul style="list-style-type: none"> ◦ Existing Conditions ◦ Cardiac limitation or MI in last 5yrs ◦ Respiratory limitation of exercise ◦ Diabetes ◦ Pregnancy ◦ Immuno-suppression ◦ Hepatic disease <p>Associated Injuries</p> <ul style="list-style-type: none"> ◦ Crush injuries ◦ Fractures ◦ Head injuries ◦ Penetrating injuries
<p>Baartmans et al., 2012 (18)</p> <p>Van Yperen et al., 2021 (11) EMSB</p>	<ul style="list-style-type: none"> ◦ Burns 10% or more TBSA in adults ◦ Burns 5% or more TBSA in children (<16 year) ◦ Full Thickness burns 5% or more TBSA ◦ Burns of functional areas (face, hands, feet, genitals, perineum, or large joints (i.e., shoulder, elbow, knee, and ankle)) ◦ Circumferential burns of the neck, chest, or extremities ◦ Electrical burns (high voltage) including lightning strikes ◦ Chemical burns ◦ Burns with suspected associated inhalation injury ◦ Any burn patient with associated trauma or (pre-existing) medical condition that may affect treatment and recovery, or could increase mortality ◦ Burns at the extremes of age — young children (<1 year) and the elderly (75 years) ◦ Non-accidental burns ◦ Burns for which the burn mechanism is uncertain in combination with uncertainty about the competence/equipment of the hospital for these types of injuries ◦ Burn wound that shows insufficient signs of healing within two weeks
<p>Reiband et al., 2014 (21) NBC</p>	<ul style="list-style-type: none"> ◦ Partial thickness burn exceeding 3% ◦ Full thickness burn exceeding 1% ◦ Suspicion of inhalation injury ◦ High-voltage burns ◦ Circular full-thickness burns ◦ Burn to the face ◦ Burn over the major joint ◦ Burn in the urogenital area ◦ Suspicion of non-accidental injury ◦ Cases of doubt
<p>Boissin et al., 2017 (19) WCP</p>	<ul style="list-style-type: none"> ◦ Age: Under 2 years. ◦ Severity: Partial thickness burns with TBSA >15%, or full thickness burns with TBSA >15%. ◦ Anatomical site: Face, hands, feet, genitalia, perineum, major joints, or circumferential burns (These burns could also be dealt with at level 1 or 2 but discretion must be used). ◦ Inhalation injury: Requiring ventilation for more than 48 h. ◦ Mechanism of injury: Exposure to ionizing radiation, high pressure steam, high tension electrical injury, hydrofluoric acid injury >1% TBSA, or suspicion of a non-accidental burn injury. ◦ Existing co-morbidity: Cardiac limitation and/or myocardial infarction within five years, respiratory limitation of exercise, uncontrolled type 1 diabetes, medically or disease-induced immune suppression for any reason, existing psychiatric or suicidal tendencies. ◦ Other severe associated injuries: For example, polytrauma or crush syndrome.

TBSA: Total Body Surface Area; MI: Myocardial Infarction; BBA: British Burns Association; ABA: American Burn Association; NBCR: National Burn Care Review; EMSB: Emergency Management of Severe Burns; NBC: National Burn Center; WCP: Western Cape Provincial.



Table 4: Adherence to referral criteria for the management of burn patients (continues)

First author/year	Length of stay in hospital (day)	Most burned area	Burn mechanism	Number of referral criteria met	Adherence to referral criteria
Chipp et al., 2008 (14)	N/A	Face	<ul style="list-style-type: none"> ◦ Flames (N=253) ◦ Scalds (N=112) ◦ Contact (N=79) ◦ Chemical burns (N=34) ◦ Other (N=83) 	≥1 (N=378)	<p>1. The rate of adherence to the BBA criteria in burn patients was 25.31% (N=142 out of 561).</p> <ul style="list-style-type: none"> ◦ Inappropriate referral: 156 (27.81%) ◦ Appropriate referral: 142 (25.31%) ◦ Over-transferred: 17 (3.03%) ◦ Under-transferred: 246 (43.85%) <p>2. The highest and lowest adherence to the BBA criteria were in TBSA burned and perineum (100%) and axilla (0%) burns, respectively.</p>
Carter et al., 2010 (12)	9.00 (SD=10.85)	Wrist & Hand	N/A	≥1 (N=1,416)	<p>1. The rate of adherence to the ABA criteria in patients primarily presented to a non-burn center was 48.00% (N=457 out of 952).</p> <p>2. The rate of adherence to the ABA criteria in a burn center was 79.98% (N=867 out of 1,084).</p>
Rose et al., 2010 (22)	N/A	Hands	<ul style="list-style-type: none"> ◦ Flames (N=9) ◦ Scalds (N=89) ◦ Contact (N=66) ◦ Electrical or Chemical (N=13) ◦ Other (N=13) 	<ul style="list-style-type: none"> ◦ 0 (N=64) ◦ 1 (N=46) ◦ 2 (N=75) ◦ 3 (N=4) ◦ 4 (N=1) 	<p>1. The rate of adherence to the NBCR criteria in burn patients was 17.37% (N=33 out of 190).</p> <ul style="list-style-type: none"> ◦ Inappropriate referral: 61 (32.11%) ◦ Appropriate referral: 33 (17.37%) ◦ Over-transferred: 2 (1.05%) ◦ Under-transferred: 94 (49.47%)
Baartmans et al., 2012 (18)	6.5	N/A	<ul style="list-style-type: none"> ◦ Scalds (N=472) ◦ Flames (N=101) ◦ Contact (N=10) ◦ Other (N=39) 	N/A	The rate of adherence to the EMSB criteria in burn patients was 80.22% (N=499 out of 622).
Davis et al., 2012 (13)	10.50 (SD=18.50)	N/A	N/A	N/A	The rate of adherence to the EMSB criteria in patients primarily presented to a non-burn center was 46.00% (N=345 out of 750).
Reiband et al., 2014 (21)	N/A	Partial thickness burns exceeding 3%	<ul style="list-style-type: none"> ◦ Flames (N=37) ◦ Scalds (N=35) ◦ Contact (N=8) ◦ Other (N=17) 	N/A	The rate of adherence to the NBC criteria in burn patients was 70.10% (N=68 out of 97).

Table 5: Adherence to referral criteria for the management of burn patients

First author/year	Length of stay in hospital (day)	Most burned area	Burn mechanism	Number of referral criteria met	Adherence to referral criteria
Boissin et al., 2017 (19)	7	Face	<ul style="list-style-type: none"> ◦ Scalds (N=1,031) ◦ Flames (N=108) ◦ Electrical or Chemical (N=23) ◦ Other (N=3) 	<ul style="list-style-type: none"> ≥1 (N=471) ◦ ≥2 (N=606) ◦ ≥3 or more (N=88) 	The rate of adherence to the WCP criteria in burn patients was 93.39% (CI: 91.8 to 94.7%).
Chambers et al., 2021 (20)	N/A	Hands	<ul style="list-style-type: none"> ◦ Flames (N=68) ◦ Scalds (N=68) ◦ Contact (N=77) ◦ Electrical or Chemical (N=13) ◦ Other (N=18) 	N/A	The rate of adherence to the ABA criteria in burn patients was 72.95% (N=178 out of 244).
Van Yperen et al., 2021 (11)	2	Burns of functional areas	N/A	<ul style="list-style-type: none"> ◦ ≥1 (N=668) ◦ ≥2 (N=309) ◦ ≥3 (N=89) ◦ ≥4 (N=26) ◦ ≥5 (N=11) ◦ ≥6 (N=3) ◦ ≥7 (N=1) 	<ol style="list-style-type: none"> 1. The rate of adherence to the EMSB criteria in patients primarily presented to a non-burn center was 70.03% (N=666 out of 951). <ul style="list-style-type: none"> ◦ Inappropriate referral: 263 (27.65%) ◦ Appropriate referral: 403 (42.38%) <ul style="list-style-type: none"> ◦ Over-transferred: 20 (2.10%) ◦ Under-transferred: 265 (27.87%) 2. The rate of adherence to the EMSB criteria in a burn center was 92.25% (N=1,119 out of 1,213). 3. The highest and lowest adherence to the EMSB criteria were in children with ≥5%

TBSA: Total Body Surface Area; BBA: British Burns Association; ABA: American Burn Association; NBCR: National Burn Care Review; EMSB: Emergency Management of Severe Burns; NBC: National Burn Center; WCP: Western Cape Provincial; SD: Standard Deviation.

